36TH CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { Ex. Doc. No. 25.

RIFLED CANNON, &c.

LETTER

FROM

THE SECRETARY OF THE NAVY,

TRANSMITTING

A report of the superintendent of ordnance at the Washington navy yard on rifled cannon and the armament of ships-of-war.

JANUARY 9, 1861.—Referred to the Committee on Naval Affairs, and ordered to be printed.

NAVY DEPARTMENT, *January* 8, 1861.

SIR: I have the honor to acknowledge the receipt of the resolution of the House of Representatives of the 3d instant, requesting the Secretary of the Navy to communicate to the House "the report of the superintendent of ordnance at the Washington navy yard on rifled cannon and the armament of ships-of-war," and, in compliance therewith, to transmit the accompanying copy of a report made to the chief of the Bureau of Ordnance, December 10, 1860, by Commander John A. Dahlgren, and referred by him to this department, with a communication on the subject.

I am, very respectfully, your obedient servant,

I. TOUCEY.

Hon. WILLIAM PENNINGTON,
Speaker of the House of Representatives.

BUREAU OF ORDNANCE AND HYDROGRAPHY, *December* 26, 1860.

SIR: I beg to transmit, herewith, a communication from Commander Dahlgreen to this bureau, on the armature of ships-of-war, with reference to their powers of resistance of rifled and other projectiles. The subject is one of great significance, in view of the fact that it has been actually adopted to a considerable extent in the navies of France and England, and with the advantage of their experience will, I presume, be soon introduced in our own.

I have the honor to be, very respectfully, sir, your obedient servant,

G. A. MAGRUDER,
Chief of the Bureau.

Hon. ISAAC TOUCEY, *Secretary of the Navy.*

ORDNANCE OFFICE, UNITED STATES NAVY YARD,
Washington, December 10, 1860.

SIR: The earnest attention now given by naval authorities to the armature of ships-of-war, and the enormous expenditure which England and France are incurring in building ships of this description, induce me to recall to the attention of the bureau the suggestions made by me on this subject several years ago.

In 1852, after a series of practice upon the hull of the United States steamer "Water Witch," principally with 9-inch shells at 500 yards, I made a report of the facts to the bureau, and, in conclusion, affirmed the possibility of guarding vessels against the dangerous action of heavy shells. The following passages may be referred to as more particularly applying to this subject.

"These conclusions, when combined, are suggestive of the following propositions:

"1st. That the sides of a vessel may be so protected by iron frames or plates as to make it nearly certain that shells will break by impinging thereon. The effect of the explosion will be almost nullified in this way."

"*Query.* Will the weight of the metallic material so used constitute a serious objection in view of the importance of avoiding the damage that may result from suffering the risk of a large shell's exploding in the frame or about the decks?

"Experiment will best determine this."

"2d. By interposing the coal stowed aboard steamers between the sides and the motive power, there is a very great probability that, in connexion with the use of iron ribs or plates on the sides, the boilers and machinery may be protected against any ordinary casualty from shells; at least during the period common to sea engagements."

"I need hardly enlarge on the great importance of enabling a steamer to overcome the objections so constantly urged against the vulnerability of her motive power."

"Whether the hull should be of iron solely, or of timber protected by iron ribs or facings, must be dependent on other considerations in connexion with those stated."

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"The formidable power of shells has long engrossed attention, and the tendency to their use is evidently on the increase. If only a moderate portion of their destructive effects be realized, there is every reason to look for more speedy results in sea engagements than has yet been witnessed; and it would be very desirable on many accounts to diminish, if possible, the capacity of this means of offence, particularly as regards sea steamers, the value of which has been materially affected by the liability of their motive power to derangement by projectiles; this consideration has exercised a controlling influence in the character of their armament, which is designed to operate at distances far greater than the pieces ordinarily found in broadside."

"So far as shells are concerned, even of heavy calibres, I am clearly of opinion that their destructive effects may be nullified, more or less,

by the use of iron ribs or plates, and the proper disposition of the coal which every steamer has ordinarily at disposal."

"And if the results here truly represent those which will occur in the average, the motive power of a steamer will be exposed to no greater risk from shells at moderate distances than that of a sailing vessel, if indeed so much."

"It remains only to see how far the effects of shot may be neutralized," &c.

The means that I requested to complete the data necessary for the design of the armature not being furnished, and no notice being taken of any suggestions, the opportunity was lost to this country of initiating one of the most important inventions that has occurred in naval affairs, the idea of which was suggested by Paixhan in 1825.

If, however, the proposition was then too much in advance of the requirements of ships-of-war, it certainly is not now.

The introduction of new and very powerful ordnance by the United States navy in 1854 undoubtedly led foreign powers to the effort to obtain even more powerful pieces, and the rifled cannon are now about to share a place with the smooth bores, if they do not replace them entirely. It was natural that the defence should be desired to proceed *pari passu* with the offence, and metallic armature has been adopted. France proposed to build thirty such ships, but was content to begin with ten, in order to correct defects by experience.

England is also rapidly endeavoring to meet the emergency at a cost of two and a half millions per ship.

The United States must of necessity follow where she might have led.

The only vessel of the kind that has actually appeared at sea is the French *Gloire*, and, though far from perfect, yet has she been so successful in the fundamental conditions as to make it certain that, with some very obvious correction, she will be equal to any necessity.

Whether it is best to follow the details adopted for this and other vessels of the kind constructed in England and France is by no means certain.

The character of their armature, which is the essential feature, contemplates the exclusion of solid shot, which, though not attained in all cases, is yet as nearly effected in the very great proportion of instances as can be useful, while shells, if not entirely neutralized, are rendered of little avail.

Now the iron sheathing used on the *Gloire* for this purpose amounts to about one thousand tons. Of course the capacity of the vessel to carry ordnance, coals, &c., upon which depends the power of attack, and to keep the sea for any length of time, are proportionally lessened.

To decrease this weight and yet to retain the material defence of the ship becomes an object; and it is the purpose of this paper to suggest whether the propositions made by me in 1852 may not still contribute to this end.

1st. Use an iron ribbing *externally*, with such stowage of coal *within* as the ship permits; using also an interior arrangement of thin plates,

calculated to give a harmless direction to projectiles, that is, from vital parts.

2d. These cannot prevent the entrance of shot, but they can be made to nullify shells, either by direct fracture, if round, or by glancing them, if from rifled cannon.

3d. Such armature need not exceed in weight one-half that of the present ship, and thus add some five hundred tons to the capacity for coal, thereby doubling that now carried.

If there should arise any objection to the ribbing not now perceived, then I would recommend that the plated armature be reduced one-half in thickness, which, I apprehend, would not leave the hull open to a dangerous action from shells; for, as I have already stated in "shells and shell guns," the proportion of round shot or shells that glance is very considerable, even on wooden sides, while great force is lost from ricochet.

Now in long projectiles this is so vastly increased that it is obviously their weakest point, and can be used well for defence. A very little inclination serves to divert them, and on metal this would be the rule, while the ricochet is so abrupt and so uncertain as to detract largely from their action.

This plan would extend the sphere of such ships materially. Now, without sailing power and relying only on steam, it is obvious that they cannot go but a few days from their depots of coal, therefore can only be used in coast defence or cruising along shore.

But these more lightly clad steamers, carrying more coal and rising with greater buoyancy on the waves, will go further, and may even, accompanied by squadrons of screw coal-ships, pass to distant seas and there, by their speed, harass commerce, blockade harbors, and engage the heaviest ships that will venture to assail them.

Should the department be disposed to entertain the question, I would remark that the experiments, suggested in my report of 1852, would furnish some data for a more thorough examination of the subject, and which I should be much pleased to complete. The number of vessels belonging to the United States navy not of use now for other purposes being very great, some one might be selected which would render good service as a target for determining the details of this important problem.

I have already remarked that metallic armature for ships was proposed by Paixhan in 1825. It will be perceived, however, by reference to his work on shell guns, that the idea is presented without any definite form, and we are left to infer from such terms as "cuirasse en fer," "armune solide," "epaisseur en fer," that he had in view a species of iron sheathing. Still it received no practical expression from Paixhan; indeed, he avers in one place (page 295) that too little is "known, elaborated, or proved," to allow of its use at that time, and that many questions were to be met before it could be applied to ships.

It remained then for others to give practical shape to the idea, and it is probable that Mr. Stevens was the first person to do so. Though this dates back some twenty years, it is yet not positively known how

far he has succeeded in attaining the purpose, as the vessel he was constructing remains yet in an unfinished condition.

What practical development Mr. Stevens gave to the idea of Paixhan I have no means of knowing, except from the report of Commodore Stockton on the practice with his 12-inch gun, where he speaks of having fired at a target similar to that used by Mr. Stevens, which was covered by a plate of iron $4\frac{1}{2}$ inches thick—a part of which, with the perforation made by the ball, has, I believe, been exposed for sometime in the New York yard, near the gun of Commodore Stockton.

The project suggested by me in 1852, as already defined at page 2, was to use *ribs*, in connexion with such a thickness of coal within as the case permitted; and as round projectiles were alone in vogue, I have no doubt that these, when properly arranged, would have been effectual.

If rifled projectiles are, however, introduced into the batteries of ships, this form of armature will no doubt be less effectual; and I therefore have now suggested the addition of interior plates, so that the projectiles which may reach them shall be diverted from the more vital parts; and the inner bulkheads of the bunkers can be made to serve this purpose.

If, however, the ribbing should be found to be useless against the rifled projectile, then I propose to substitute a system of smooth plates, *corrugated* or *grooved*, so as to take advantage of the glancing property of the rifled shot or shell.

It is, of course, needless for me to enter into details or dimensions, until there is some probability that the department desires to have a practical solution of the problem.

I have the honor to be, very respectfully, your obedient servant,

JNO. A. DAHLGREN,

Commander in charge of ordnance department in yard.

Captain GEORGE A. MAGRUDER,

Chief of Bureau of Ordnance and Hydrography.